Moving Knowledge – Touch the Clouds

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Abstract: A resilient industrial 'grammar of schooling' is challenged by technological disruption. On a backdrop of commodification and globalization this thrust is marked by the rapid uptake of multi-touch access devices within wireless client-server architectures. Based on two sets of empirical data and personal observations this paper abductively suggests that we may think of this in terms of the increased importance of (i) intellectual commonplaces, (ii) attention streams and (iii) body languages. In this paradigm the educational institution should be careful not to become a pure operator of extrinsic certification.

Background: The Grammar of Schooling

In the nomenclature of the Unified Modeling Language (UML) a use case visualizes some functional requirement for a computational system. The interest is specifically directed at how users (*actors* in UML) may relate to software and how these relationships string together to form comprehensive interaction systems. In a similar vein, we refer to usage patterns as the way in which people habitually interact with their digital devices. We expand on this concept to embrace a more text- and communication oriented lingo: Use cases and usage patterns are constituents of a (communicative) genre. These genres refer to rhetorical situations where participants make behavioral decisions based on the commonalities of that situation, and also repeat them under similar circumstances. A typical example is given when email messages replace face-to-face interactions. The sender may assume that a question has been properly posed or that information has been properly delivered or that a request deserves an immediate response. But the recipient does not necessarily think the same. Emails are minted in different denomination and belong to a different rhetorical situation than when people meet and greet in person. The core term above is "properly" which means according to mutually accepted norms. No such social contract has (yet) been generally established for email.

When communicative circumstance and habitual response "solidify" we deal with a new element of habitus as described by Bourdieu (1990). Habitus is for him the largely sub-conscious, but not un-conscious, schemata for how people perceive and understand, act and react in a given situation. Habitus is internalized and therefore repetitious, but it is not deterministic. It is a bodily propensity or innate disposition to act in a certain way.

A 'grammar of schooling' is the set of rather general and intrinsic rules with which educational institution put together their products and services, the building blocks of educational habitus. This may be described as the patterned slots of time and space into which students and teachers are subjected to a set of well-defined rules and rites for entry, behavior and exit. This social structure reflects a given knowledge domain and its representational modes which are refactored and sequenced into delimited taught subjects (Tyack and Tobin 1994).

	2009	2010	2011
Immediate <= 1 year	**mobile computing** cloud computing	**mobile computing** open content	**mobile computing** **electronic books**
Intermediate 2-3 years	geographical information personal web	**electronic books** **augmented reality**	**augmented reality** game based learning
Emerging 4-5 years	semantic-aware applications smart objects	**gestures** visual data analysis	**gestures** learning analytics

Table 1 The Horizon Reports 2009-2011 - Main trends in Educational Technology

Over the last 20 years the resilient 'grammar of schooling' for industrial society has been challenged by technological and economical disruption. The thrust is now characterized by advances in wireless client-server architectures, i.e. software and repositories as on-line service, and the corresponding proliferation of portable multi-touch access as access points. An important backgrop is given by the commodification and globalization of the

entire field of symbolic work. The trend extends to a web of mediated social relationships in social computing. This has a direct impact on the publishing model for books and other materials both online and offline and is of great importance for teaching and learning.

Each year The Horizon Report brings for instance together experts in the field to discuss and present current trends in the immediate, intermediate and emerging perspective. Summarizing the three last years in Table 1, we find that computing, electronic books and gesture-oriented computing are recurring elements that lend support to this assumption (Johnson et.al. 2009, 2010, 2011). E-books currently comprise 20-25% of the US book market and are expected to reach 40% within 5 years, while Europe lags behind with 1.2% saturation in Germany today, 1.5% in the Netherlands and 10% in Great Britain. But numbers are expected to go up also here (Beuve-Méry 2011).

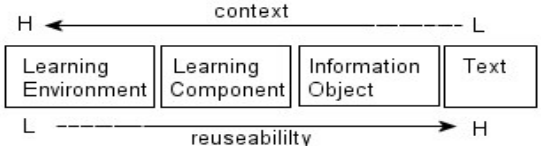

Figure 1 Context versus reusability of learning materials

The *Learnativity model* (Duval 2002, see Figure 1) states that text assets as content units are low on context and high on reusability, while the opposite is true for learning environments. The new publishing and usage models for digital text and other educational materials seem to question these distinctions; or rather: to redefine their inner relationship. We see a development where discrete textual objects as well as software-as-service (*online apps*) and the entry points to repository-as-service are retrieved, appropriated ("consumed") and interactively produced or augmented within (digital) contexts. The specific institutional tools for handling these materials and these functions, - like libraries, learning centers, IT centers, audio-visual units etc.-, are confronted with the task of handling the continuum that exists between discrete learning objects or *text-as-such* and the entire learning environment. This has conceptual, organizational and operational aspects. They impact the very nature of the educational institution.

Methodology and Data Sets

This paper is a report on on-going work to explore the development of online texts and interaction with them. The purpose is to suggest elements for a conceptual framework that might further practical experiments and course development. The overall context is here given by an on-going training program for teachers, learners, librarians and other educational producers in a larger development project called *Learning and Teaching in a Digital World*, or *LATINA* that is hosted by the Learning Center and Library at Oslo and Akerhsus University College in Norway. We combine rather intensive work in small groups with extensive use of web-based tools and media. The curriculum and didactical approach has been developed since 2008 for summer and winter schools of 1-3 weeks duration. The courses have so far been offered in Norway, Finland, China and the Palestinian Territories with attendance by some 100 students and lecturers from Europa, Africa, Asia and the Middle East.

Our methodological approach derives from this situation with a continuous need to develop the practicalities of curricular development and student interactions. We are engaged in gradualism and *muddling thru'* with some degree of systematization and thought to it. For such purposes, experiential and abductive approaches are appropriate.

As a contrast to the experimental norms of natural sciences, an experiential approach is eclectic with a bent towards *bricolage*. The latter term derives from *bricoler* and *bricouleur* which is the French equivalent to the English *handyman* and *Jack-of-all-trades*. This Jack is able to handle many contingencies with the resources that happen to be at hand, but he lacks mastery. Or his mastery resides precisely in this breadth and scope of activities.

An abductive approach is an accepted tool in the scientific toolbox. The abductive argument is based on an informed guess as to the likely and economical cause or source of events. It should follow the (economical) principle of Occam's razor and law of parsimony: Among competing explanations, choose the one that makes the fewest new assumptions. In concept building, this norm may be reformulated as an effort to develop conceptualizations that tentatively and reasonably may be used to frame events and circumstances.

The current investigation refers to two sets of empirical data. The first contains 103 items of reader feedback to a news story in the New York Times in late 2010 (Bilton 2010). The second is composed of 78 micro reports from a group of students and teachers as volunteered by them when they tested several touch-enabled devices at Oslo University College in Norway during the spring of 2011. The following are highlights from these materials.

The New York Times story expressed the journalist's opinion of the third version of the Amazon Kindle. This was compared to the new iPAD that was launched earlier that spring. Within one single week of publication a total of 102 readers responded with the 103rd adding his comments 8 months later. A typical entry reads:

> *I admit, I bought myself a Kindle for Xmas and am enjoying reading using the gadget. Weight, size, portability, battery life and having a device that is not backlit and is therefore easy on the eyes were important. I also want to be offline when I read, a computer is too distracting. I also enjoy being able to increase the text size in the evening and not have to reach for a pair of glasses. Thinks Amazon needs to improve: Having the Kindle book price a few dollars less than the paperback pricing. Sometimes the Kindle pricing is more expensive, which does not make sense. Being able to loan books, or borrow books from others. Ability to read e-books from the library.Not sure if Amazon see any incentive for my last two wishes, but as an avid library supporter and book swapper, I hope they do.*

From these experience reports we may initially discern four facets or dimensions, namly the physical characteristics of the device, textual content, economics and privacy issues. A few entries also discussed paper consumption and the protection of trees. In more detail the dimensions relate to

1. **Physical aspects** of the device or interactions with it like screen quality (visual resolution, tactile resolution, contrast, display technology), portability (weight, size, balance, fits the hand, button placement, degree of "wirelessness" like WiFi and 3G/4G and the time away from a mains socket), storage amount and type (hard drive, flash memory), realiability (resistance to humidity/condensation, heat/cold, shock), simplicity of use ("a child /Grandma' may use it"), sensory qualities (visually pleasing, smell of paper, touch/texture)
2. **Content availability** e.g. "off the beaten track", scope/thematic coverage, access to many, rare or new titles, supported formats – relative to content – and options for format conversions
3. **Economics**
    a. **Cost of device** e.g. upfront purchase, total cost of ownership and cost of one multipurpose device versus several dedicated devices.
    b. **Cost of content** by itself and comparative for digital versus printed material
    c. **Model of payment** e.g. own or rent (including network access plans), borrow content from library and to/from other uses, usage rights, royalty issues for authors
4. **Privacy** e.g. surveillance as to content consumption, geographical positioning/presence, personal details, identify theft etc.

In the context of learning and teaching we highlight as most important the dimensions of (1) portability, (2) usability and (3) content access. This should be understood in relationship to the entire space or "textual ecology" of which these devices are part.

We will therefore supplement the readers' comments on their reading experiences with data from a local investigation on both reading and writing by registered students.

These participants were recruited using flyers and posters within our own institutions where we targeted students in engineering, primary education and librarianship. But everyone was equally welcome to show up in the project office adjacent to a public area in the Learning Center and Library. 23 students and teachers volunteered. The participants were encouraged to register Twitter-like micro reports on use situations and usage modes as they occurred. We asked for all kinds of experiences, but particularely read-and-write combos like annotation of textbook material and "pure" writing. To encourage the participation each micro report was considered as a ticket in an iPad lottery.

A total of 78 records were posted. They reflected experiences with iOS- and Anroid-based devices as shown in the distribution in Figure 2.

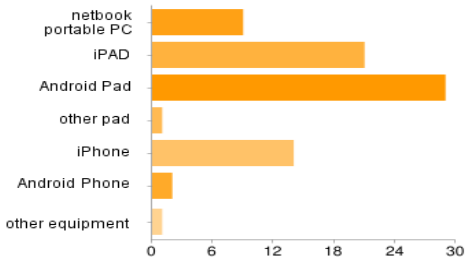

Figure 2 Response relative to device type

Responses were unevenly distributed throughout over time as shown in Figure 3. This reflected the initiation and three subsequent and face-to-face meetings of the participants. The following two examples show typical entries to the database. The first follow the reporting structure with a brief description of the usage mode or context and an explanation of the experience involved:

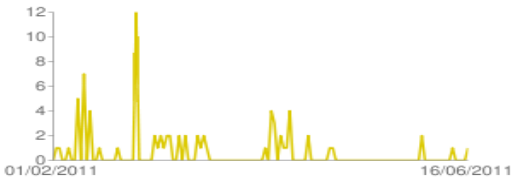

Figure 3 Response rates February to June 2011

Situation (1): *Sitting in the reading room for master degree students and tried to read from the syllabus on my iPad. I had books in PDF format, and tried to find a comfortable way to read that would correspond to reading a real book.*

Experience (1): *The most positive experience was the ability to look up individual words in the text. Among the negative was that I could not skim/scroll quickly as I can with a regular book. Moreover, I never found a comfortable way to hold or position the iPAD for easy reading. I could not treat it as a regular books for fear of damaging it. I have used the iPad mostly as "reference work", ie to google different topics, check and update Facebook, check my emailetc. For such purposes, i.e. normal browsing and web use it works great. But I would not prefer to read textbooks on the iPAD compared to paper print.*

The second example also illustrates substantive, but less structured reports. The situational description comprises experiental content and suggestions. Several different usage modes were reported:

Situation (2): *At home at 9PM. I usually watch the news or read a printed newspaper. I tried various content and functions on the iPad. It was fun to write on such a keyboard (and) easier than I had imagined.The keys might have be somwhat bigger, but OK when getting used to. A little silly that the iPad suddenly produced other terms all of a sudden, e.g. mass murder or something, when I wanted to write something completely different. (It was) fun to read books on it with the the preinstalled program. The zoom function was good, (I) can read without lenses:). The same for the bookmark function. IPad is very fast. The programs close and open quickly.*

Experience (2): *I read comics with the comix browser. This was a cartoon I probably would have thought was boring (blood and gore is not particularly my style). It was a pretty exciting movie-like experience with guided movement. One may use this mode for teaching with pictures and graphs and such. Good with zoom. Perhaps such a web presentation together with music, film clips, text and images is a good way to capture the attention of students who easily lose interest? This seems to be a smart program for children and adolescents. And Prezi or something similar could be used by student groups in cooperation with teachers. This is a little more hi-tech than PowerPoint. (I get fed up) by the grey presentatiaons of several teachers. This could have been a great way to guide new students through material they need to look at. It might be fun to read newspapers in this wasy also, but that is another issue.*

The situational descriptions are generally short or even terse, though, like *at home*, *in bed*, *on the bus*, *in the dining hall* etc. Most of them point to usage situations on the move or at least not characterized by sitting at a desk at work/study or in the home. In a few cases the respondent offered a more motivational description of his or her inner "situation" as in *I wanted to share an experience* or *I needed information about topic X*.

Many commented on the reading experience, which is considered good or better than with traditional textbooks, thus lending support to the evaluations in the first data set. The more valuable experiences, though, are the ones that go beyond reading with particular mention of these aspects:

- Touch screen keyboards are described as better than expected and useful to type shorter messages, email etc., but not as useful for extended writing.
- Touch technology is well adapted to create mindmaps and similar graphically oriented structures.
- It seems difficult to annotate reading materials in the PDF format.
- Pads and smartphones are useful to pursue other interests and tasks during non-inspiring lectures.
- It is difficult to follow up on the lectures because it takes time to open applications, finding the right file etc.

As indicated earlier, the most important reading of the two data sets should be done *between the lines*. There we find the traces of the rhetorical situation and the axiomatic or "taken-for-grantedness" of access to *books, graphs, images, cartoons, video clips* etc. Users do describe some technicalities, but all along they relate this to the readiness or at-hand character of the particular device relative to content, - not deficiencies with the content as such. In the case of Kindle, the availability of Amazon ebooks is the obvious example. Let us therefore use Press Reader App for Android instead.

This App and its sibling incarnations for other operating systems provide the lecturer with access to some 1700 newspapers, 2.000.000 books and an untold number of magazines within one single interface. With the right credentials and a low monthly fee, the reader may move from phone to pad to PC and back and have full access to the purchased content.

We might equally exemplify this using the iClod repostiories of books, music and movies or the Spotify music service that is now integrated with Facebook etc. This is what the wireless client-server modell – The Cloud – is about. Its impact on learning and teaching is what interest us here.

To the responses mentioned above, we therefore add two personal experiences with cloud-enhanced interactive whiteboards for face-to-face and on-line lecturing. The first derives from extensive "writing" of mindmaps and similar network structures using various input devices like pads, phones and computers. Group oriented presentations and discussion of these text structures were supported by interactions on our Smartboards. We found mindmaps to be particularly suited to individual and also collaborative course and project planning, budgeting and concept development (Høivik 2011). The second experience consisted in online video presentations in real time and as recording where ineraction with material on the Smartboard was used to enliven the traditional "talking head" approach. Transmissions covered both the whiteboard display as such in the main window as well as the lecturer initeracting with the same whiteboard as a separate window.

Discussion: Commonplaces, attention streams and body languages

We caution that the results from these two investigations are skewed towards the opiniated; the opinions and experiences of enthusiasts, recent technological converts and other early adopters. In our case this is not a disadvantage since we are not looking for the characteristics of mature and domesticated technologies. We wanted to understand more about the cutting edge of daily life, so to speak, based on the need to develop new courseware for similar target audience.

One should additionally note that the first data set from the New York Times generally relate to the read-only or read-mostly usage mode of the early Kindles. If these commentators were the jury, the overall verdict would be that the Kindle is an easy, pleasant and useful device, while alternatives like the iPad or the Galaxy Tab from Samsung are more versatile. But the jury was still out as to which platform would win in the long run.

Another conclusion can readily be made: The pads and smartphones contain few or no moving parts. In addition to the general tendency for electronic equipment, this predicates a rapid decline in production costs. All other factors being equal and over the long haul this translates to radically diminished prices as illustrated in Figure 4.

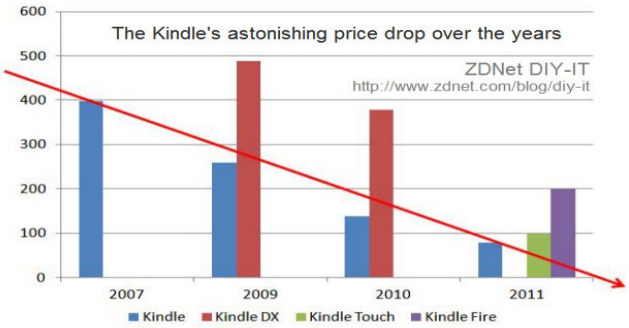

Figure 4 Kindle price decline

What does the material tell us beyond the obvious?

We interpret the comments and reports against the backdrop of the reproduction-oriented schooling of the 20th century, with its emphasis on Reading, 'Riting and 'Rithmetic. In this older paradigm the placements of textual sources were performed in a tangible world; - on the two-dimensions of the page or blackboard, within the three dimensions of a printed tome (two dimensions of each printed page and a third for the stack of pages) and in the multidimensionality of volumes, book shelves, rooms and institutions.

This alignment between socio-physical space and textual content has been broken.

Today the physical and virtual spaces may overlap, but may equally disentangle and appear disjunct. Most of the remarks in our data sets reflect on this, either as de-location of the reading and writing experience as such or as de-location of content from their traditional sources. The established concept of space and spatiality does not disappear, however, even if the importance of the *physical* characteristics is diminished. The trend is reflected in our linguistic behavior as when we *browse/traverse/jump/follow a link*, *look for* or *store* and *publish* or otherwise operate on textual content. Increasingly the interactions with texts take place in a *different* space.

It still happens "somewhere", but where? Or rather: What is the meaning of this "where" when it is increasingly difficult to give the geographical coordinates? What are the characterics of this rhetorical situation? How can we understand the new kinds of bodily interactivity of touch, of orality and visualization that is intimately bound to the usage of new electronic devices? How can we understand the body as a vector in this expanse?

Phenomenologically speaking our attention is never pure consciousness, - it is always *directed*. In reading and writing it moves towards and through subdomains of textual corpora. That something moves relative to something else presupposes location. To argue his case an author also brings together expressives that are sequentially or otherwise relative to each other. When these are mediated in writing or by other means of (digital) utterance, they form spatial structures.

Both aspects have been extensively investigated as the linearity of handwritten and printed texts and as the multilinearity of hypertexts. To give more substance to the rhetorical situation that this implies, we will use an important observation by Walter Ong. Referring to the agonistic and formulaic characteristic of oral argument in pre-print and pre-literate cultures he writes that

> *Developing a subject was thought of as a process of 'invention', that is, of finding in the store of arguments that others had always exploited those arguments which were applicable to your case. These arguments were considered to be lodged or 'seated' in the 'places' (*topoi *in Greek,* loci *in Latin), and were often called the* loci communes *or commonplaces where they were thought of as providing arguments common to any and all subject matter.* (Ong, 2004)

We will answer our question about "where" or "place" by defining them as *commonplaces*, i.e. a habitual rhetorical structure of fact and argument. Whereas pre-print cultures relied on human memory and developed mnemtoic devices like spatially arranged argument (as in travels and adventures) and storytelling, the new and virtual locations are found within global hypertext by means of pattern recognition. Never-sleeping spiders traverse this web to build the indices that we use to align the search keywords with relevant texts, as if it was second nature. Additionally we take recourse to contextual support structure and delimitations like the collections of items in terse database records and the long, middle and short: the more freewheeling texts of long monographs, intermediate papers and shorter dictionary entries. Even if some mediated utterance is considered to be new in this space, this

newness is always related or similar to something older. The rhetorical situation is based on the soliditiy of ever-present and always accessible textual material.

We experience that ubiquitous and cloud-based computation, and partiuclaery its "moving" incarnation with smartphones and pads, de-locates us from the materiality of books and buildings. But space reappears in a new incarnation. Academic work and education is re-located within this expanse which is a space composed of massified and commodified textual expression. Together the textual paragraphs, still images and video sequences form global commonplaces that are available for the development of recurrent arguments and the voice of thousands and millions of researchers, teachers and students.

The attention of readers and lecturers, producers and authors move relative to placements in the digital space as when we browse or retrieve ("pull") data from the repositories on the Net,- the Document Universe or DocuVerse.

Reversing this metaphor, we may see the subjective mind as fixated relative to flows and feeds of content. This is widely practiced through Real Simple Synidcation (RSS) streams which are handled with elegance by certain Twitter-based programs and by the YouTube channel feeds etc. Such feeds are individually or collectively curated; implying that content is filetered and redirected from other streams or pulled from placements in the DocuVerse.

Both conceptualizations are useful as general guidance and architectural building blocks, i.e. as components of a new 'grammer of schooling', in education. A course may then be seen as a set of commonplace arguments and facts that the students should "visit" or "pull out" and appropriate. It may equally be conceptualized as a stream of materials whereby learners are exposed to the pedagocical tactics of "push" and "pressure". Finally it may be considered a multi-dimensional landscape that is superimposed on physical coordinates. In their learning process students must move through both of them.

In all cases we deal with (textual) space that may be *described* by terse metadata that may be interpreted by human mind or mechanical algorithm. It may also be *handled* as a composite of Learnativiy Model components and practically so as web sites, time-based multimedia, ebook closures etc.

Conclusion: Intrinsic versus Extrensic Certification

To create, retrieve and receive textual material in education is attentive activities that are preconditioned on space and placement, - of words on pages, books on shelves, shelves in libraries and people interacting in rooms and lecture halls, lawns and cafeterias. Traditional education may be seen as an "appropriating movement" through such Newtonian spaces.

With the ubuiquitousness of computational and representational screen estate, new learning spaces are being born. Factual (or "traditional" Newtonian) space and the quality of spatiality as such become less tangible. One may thus question the functionality of brick-and-mortar institution as structuration devices for knowledge production and appropriation. One may also question the functionality of physical texts with the supportive formalized and informal reference systems.

Epistemic knowledge on the introductory and intermediate levels are turned into "commonplaces" that are available to anyone. The integration of such codified knowledge in running practices run counter to academic institutionalization.

The academic institution as such is thus faced with a dilemma:

On the one hand it may maintain a traditional distinction between epistemic and hands-on knowledge with a focus on the former and thus risk devaluation of this formalized knowledge as so many commonplaces. On the other it may integrate with the commonalities of productive endeavours outside its walls and thus risk the devaluation of its social standing.

With reference to its privilege of certification, we may rephrase these two alternatives as follows:

On the one hand the educational institution may maintain its formal identiy while increasing productivity by certifying a growing number of students. This will be based on their appropriation of epistemic commonplaces. This is extrinsic learning.

On the other the higher institutions of learning may reinvent themselves through economies of scope for contextualized learning which creates an interplay between episteme, inventiveness and life-world application.

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